

- (t) Crystalline compositions produced from glass compositions.
- (u) Some refractory oxides which exhibit one or both of electrostatic and magnetic properties.

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While the embodiments described herein are illustrative of the principles of this UCDP invention, various modifications and advantages may be achieved by those skilled in the art without departing from the scope and the spirit of the invention; as defined by the following claims.

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WHAT IS CLAIMED IS:

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1. A process for producing a refractory oxide which comprises (a) reacting an aqueous hydrogen fluoride solution or its derivatives with: (1) at least one metal fluoride, or (2) at least one metal fluoride and at least one metal oxide, or (3) at least one metal oxide, to form either a blended dispersion which produces a cationically-homogeneous, nanostructured colloidal mixture, or a solution; (b) removing the liquid from either the colloidal mixture or solution and forming a dried product; (c) heating the dried product to produce a solid state metal hydroxyfluoride and volatile by-products; (d) further heating the thus-produced metal hydroxyfluoride to a higher temperature at which it chemically decomposes, by heat alone, into a cationically-homogeneous nanostructured solid state refractory metal oxyfluoride and volatile by-products; and performing one of the following heating steps: (i) heating the thus-produced metal oxyfluoride to a solid state decomposition-temperature at which it chemically decomposes, by heat alone, into a cationically-homogeneous nanostructured solid state refractory oxide; or, (ii) heating the thus-produced metal oxyfluoride to a molten state decomposition-temperature at which it chemically decomposes, by heat alone, into a cationically-homogeneous nanostructured solid state refractory oxide; or, (iii) heating the thus-produced metal oxyfluoride to a vapor state decomposition-temperature at which it chemically decomposes, by heat alone, into a cationically-homogeneous nanostructured solid state refractory oxide.

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2. The process of claim 1, wherein the reactants for step (a) comprise at least one metal fluoride.

3. The process of claim 1, wherein the reactants for step (a) comprise at least one metal fluoride and at least one metal oxide.

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4. The process of claim 1, wherein the reactants for step (a) comprise at least one metal oxide.

5. The process of claim 1, wherein the reactants for step (a) comprise MgO; and the heating of the oxyfluoride is at 1315°C to produce transparent MgO.